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Office of Technical Assistance
Executive Office of Environmental Affairs
Commonwealth of Massachusetts

Toxics Use Reduction Case Study

METAL RECOVERY AT HOWARD H. SWEET AND SON, INC.

SUMMARY

Faced with new regulations that required it to implement further pollution controls, Howard H. Sweet and Son chose to forego traditional techniques for treating pollution that has already been created, in favor of a virtually closed-loop metals recovery system that promised to prevent pollution from being created in the first place. During the first year after the new system's installation, the company recovered 263 troy ounces of gold and more than a ton of copper -- in all, more than \$90,000 worth of saleable metal. At the same time, the company entirely eliminated its generation of toxic sludge, thus lowering its disposal costs.

BACKGROUND

Howard H. Sweet and Son is a 125-worker jewelry manufacturer specializing in the production of silver, gold and gold-filled beads, chains and findings. The company's operations are widely integrated, spanning from the design and manufacture of the working parts for its own chain-making machines, to the stamping of flat stock and tubing, to bead and chain making, to the soldering, plating and assembly of finished jewelry.

In late 1985, Howard Sweet was faced with new regulations requiring it to implement further pollution controls. The company determined that a major source of hazardous waste was its burn-out room -- where copper used in the fabrication of gold beads is stripped away.

TOXICS USE REDUCTION PLANNING

Faced with this requirement to implement new pollution controls, the company first examined traditional wastewater treatment options. Problems of space and cost immediately became apparent.

The company then looked at the cost, space requirements and compliance reliability of equipment offered by ACCA Technologies Corporation of Plainville, Massachusetts. With the ACCA Technologies equipment, Sweet found that it could meet its wastewater discharge limits in a cost-effective way. (See Figure 1 for a cost comparison of the two options.)

TOXICS USE REDUCTION MODIFICATIONS

Howard Sweet chose to invest in the ACCA system, which amounts to a virtually closed-loop recovery system for copper and gold. The company was so pleased with the modification that it asked the Office of Safe Waste Management (renamed the Office of Technical Assistance in 1989) to conduct a source reduction inventory at its facility on Walton Street in Attleboro, Massachusetts. The Office of Safe Waste Management analyzed the company's production processes and management practices, then offered suggestions for reducing the generation of manufacturing byproducts. It recommended that the company evaluate in-house methods of recovering nickel and rhodium, and that it investigate gold bath management techniques which offer the potential for enhancing the efficiency of metals recovery and increasing the value of recovered metals. In addition, the Office of Safe Waste



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Management suggested several techniques for improving solvents management to reduce solvent use and conserve water. If implemented, these recommendations could lead to cost savings as well as to reductions in waste generation.

RESULTS

Reductions Achieved: During the first year of operation, Sweet's new system recovered 263 troy ounces of gold and 2,144 pounds, or more than one ton, of copper.

Economics: The capital and engineering costs for the ACCA Technologies system totaled \$95,000. Income from the recovery of additional gold and copper covered these up-front costs in 12.6 months. After the first year, the company expects its new system to return over \$95,000 in recovered metal annually, while doing away entirely with its need to pay for sludge disposal.

The true savings realized by the investment are best assessed by comparing it to the traditional pollution treatment system that Sweet would have had to invest in if it had not opted for metals recovery. The following chart offers such a comparison.

Figure 1: The Costs of Treatment vs. The Costs of Recovery

Cost Categories	Wastewater Treatment	ACCA Technologies
Capital Cost		
Engineering	\$200,000 (included)	\$65,000 \$30,000
Expenses		
Labor	\$37,500	\$7,500
O&M	\$52,500	\$10,500
Disposal/Sale of Gold	(\$40,000)*	(\$107,200)**
Disposal/Sale of Copper	\$1,350***	(\$879)****
Total First Year Cost	\$251,350	\$4,921
Annual Operating Cost	\$51,350	(\$90,079)
Payback Period	None	12.6 Months

* Assumes recovery of 100 oz. of gold at \$400/oz., as per pre-existing recovery system.

** Actual gold recovery with ACCA system was 268 oz. per year.

*** Assumes that disposal facility takes 18,000# of copper sludge at \$0.60/gallon.

**** Actual copper recovery was 2144# per year, sold at \$0.41/#.

This Case Study is one of a series of such documents prepared by the Office of Technical Assistance (OTA), a branch of the Massachusetts Executive Office of Environmental Affairs whose mission is to assist industry in reducing the use of toxic chemicals and/or the generation of toxic manufacturing byproducts. Mention of any particular products or proprietary technologies does not represent an endorsement of same by the Commonwealth of Massachusetts. OTA's non-regulatory services are available at no charge to Massachusetts businesses and institutions that use toxics. For further information about this or other case studies, or about OTA's technical services, contact: Office of Technical Assistance, Executive Office of Environmental Affairs, 100 Cambridge Street, Boston, Massachusetts 02202, or phone OTA at (617) 727-3260.